eg. A spring is 20.0 cm long. When I hang a 500 g mass on it, it extends to 39.0 cm. I pull the mass down 2.0 cm and let go. Determine:

a) elastic constant

F=-kx k= F/x = mg/(L2-L1)

= (0.50kgx9.8N/kg)/(0.390m-0.200m)

4.9/0.19=25.7895

= 25.8 N/m

why 19cm for x? that is equilibrium point, where elastic force = gravitational force

b) elastic energy relative to the equilibrium position when you pull it down 2.0cm.

$E_{elastic} = 1/2\ kx^2$ = 0.5x(25.7895)x(0.02)x(0.02)=

0.0052 J

c) kinetic energy when it is in the equilibrium position

$E_k$ = elastic energy if no energy is lost

= 0.0052J

d) speed at equilibrium position

$1/2mv^2=E_k$

v = Sqrt(2x0.0052/0.5)=0.14422205101856

v= 0.144m/s

0.242-0.167=0.075 peak to trough distance,
so amplitude = 0.075/2=0.0375

$1/2\ mv^2 = 1/2\ kx^2$
x = root(m/k) v
v= root (k/m) x

last question:
sketch the energy graph, showing elastic energy, kinetic energy and total energy of the 0.50 kg mass on the spring, k=26N/m with amplitude of 2.0cm.   Energy vs x

review kinematics:

eg. A car is moving at 15.0 m/s and slows to 10.0m/s.  determine the acceleration if

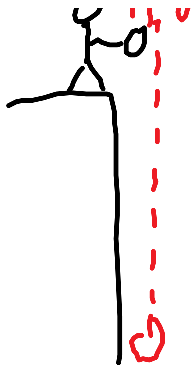
a) the change takes 12.0s
b) the change is over a distance of 30.0 m

A ball is thrown up off a 30.0 m high cliff with a speed of 8.00m/s.

a) how high does the ball go?
b) what is the speed of the ball when it hits the base of the cliff?
c) how long does it take to hit the base of the cliff?

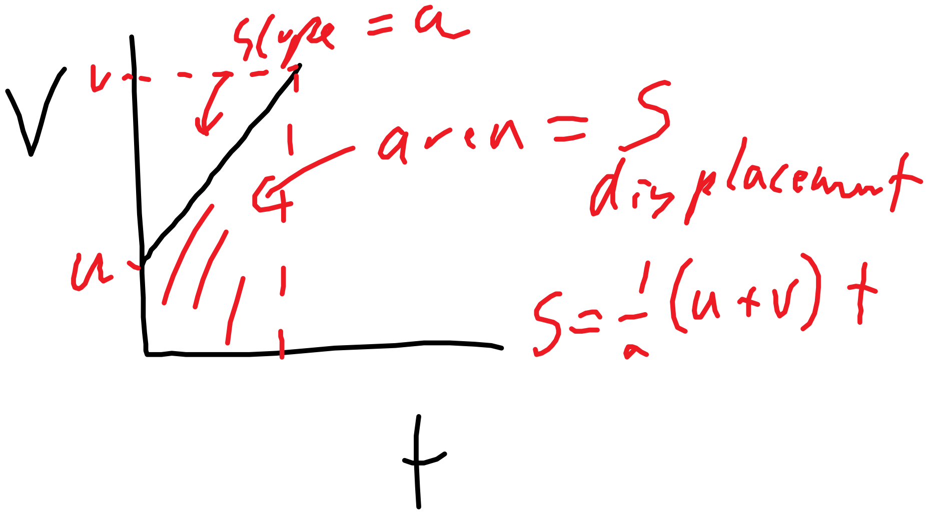

uniform acceleration

$a = \Delta v/\Delta t = (v-u)/t$  where u is initial



uniform acceleration

$a = \Delta v/\Delta t = (v-u)/t$ where u is initial velocity (a is slope of v-t graph)

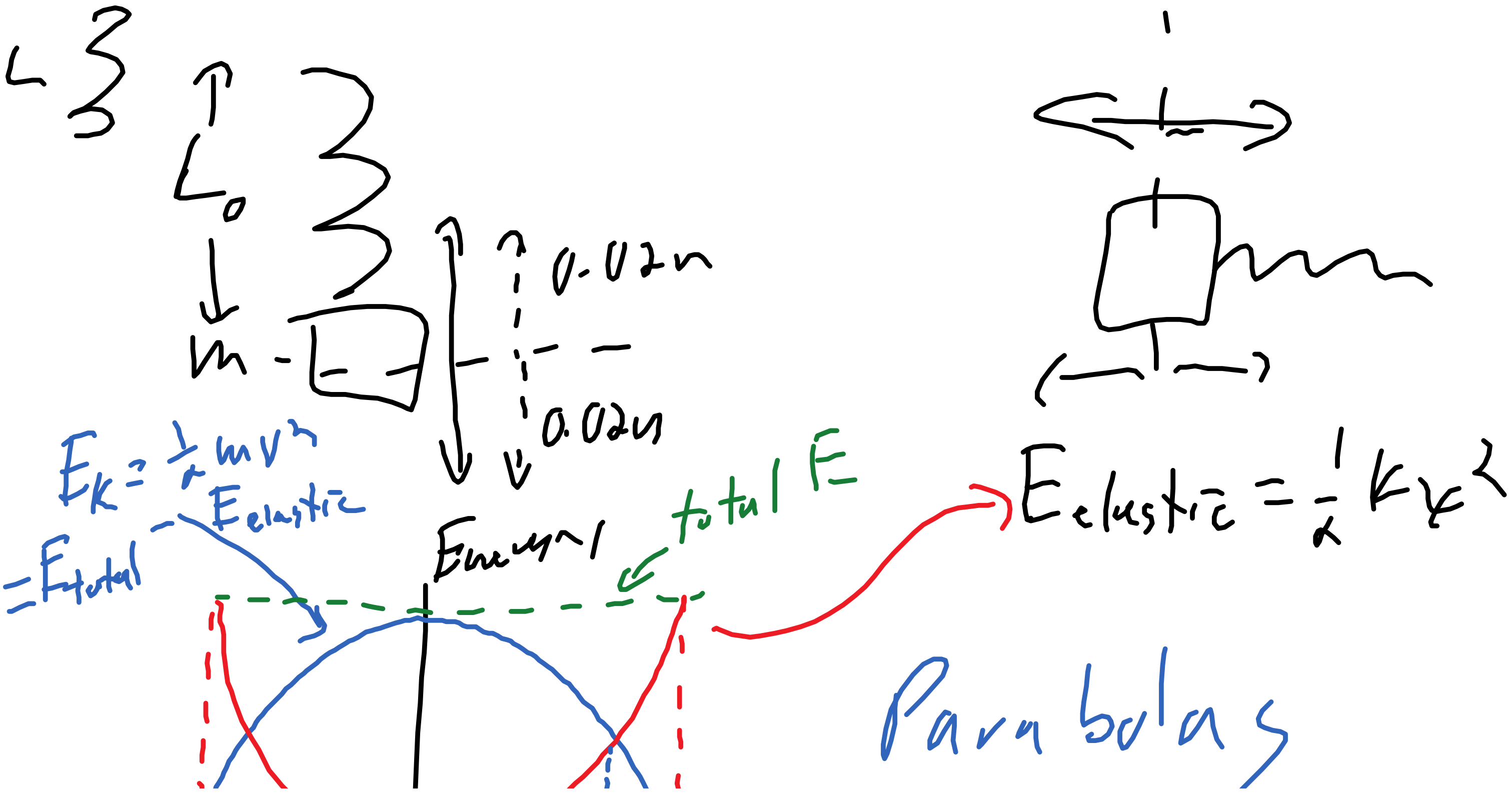


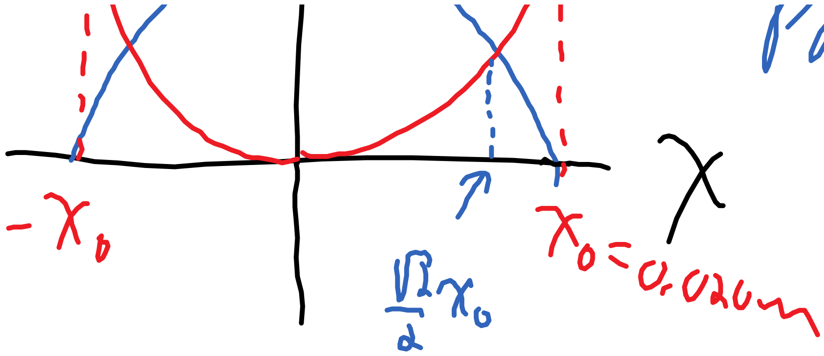

$$V^2 = 2as + u^2$$

$$S = ut + \frac{1}{2}at^2$$

P38-40

Q21, 27, 33, 39, 41, 45






Parabolas

a) $a = \frac{v-u}{t} = \frac{10.0\,m/s - 15.0\,m/s}{12.0\,s}$

$= -0.42\,m/s^2$

b) $d = 30.cm$, $v = 10.0\,m/s$
$a = ?$, $u = 15.0\,m/s$

$v^2 = u^2 + 2as$

$a = \frac{v^2 - u^2}{2s} = \frac{10^2 - 15^2}{2(30)}$

$a = -2.08\,m/s^2$